

REMARKS

Claims 32, 34, 35, 37 and 38 are pending. Claim 32 is amended and new claim 38 is added. Claims 34, 35 and 37 have been allowed.

Claim 32 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kawakatsu in view of either one of Sogo or Mori et al. Favorable reconsideration of this rejection is requested in view of the amendments made herein.

Claim 32 has been amended to specify a vertically moveable support member for supporting said semiconductor element. See Figs. 20 and 21 of the present specification in regard to a support member 90. The combination of references fails to teach or suggest the presently claimed invention.

Kawakatsu (US 5,388,752) discloses an open-type booth. Nitrogen gas is ejected from the nozzles 21 and 25 toward the part 20, but the nitrogen gas will spread out into the atmosphere after it impinges against the part 20. Therefore, there is no reason to add an oxygen sensor in the booth. An oxygen sensor is arranged in experimental equipment.

Kawakatsu discloses a horizontally traveling conveyor 1 by which workpieces 4 are supported. Some of the molten solder is raised to contact a lower surface of the workpieces 4. Nitrogen gas is locally ejected onto the part 20 at the interface between the raised solder and the lower surface of the workpieces 4. Nitrogen gas is not ejected toward the flat upper surface of the molten solder.

In contrast, the support member 90 of the present invention with the semiconductor element is vertically movably arranged toward and away from the upper surface of the molten solder, so that the bump elements can be immersed in the molten solder.

In the present invention, the upper surface of the molten solder bath can be covered by an inert gas such as nitrogen gas, and oxidation of the molten solder is prevented. If the inert gas is ejected directly to the upper surface of the molten solder, the upper surface of the molten solder will be disturbed and ripple. In the present invention, the upper surface of the molten solder will not be disturbed and ripple due to nitrogen gas, because the nitrogen gas is not supplied directly to the upper surface of the molten solder but to an appropriate place in the booth. Therefore, the upper surface of the molten solder is flat and smooth, and the bumps can be uniformly immersed in molten solder. The flow of the nitrogen gas is further moderated by the gas-pressure buffer duct 94 recited in new dependent claim 38.

The secondary references fail to provide the teachings which Kawakatsu lacks.

For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by Applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicant's undersigned attorney.

Response under 37 C.F.R. §1.111

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If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP



Stephen G. Adrian
Attorney for Applicants
Registration No. 32, 878

SGA/jnj
1250 Connecticut Avenue, NW
Suite 700
Washington, D.C. 20036
(202) 822-1100

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